General

Guideline Title

ACR Appropriateness Criteria® radiologic management of mesenteric ischemia.

Bibliographic Source(s)

Fidelman N, AbuRahma AF, Cash BD, Kapoor BS, Knuttinen MG, Minocha J, Rochon PJ, Shaw CM, Ray CE Jr, Lorenz JM, Expert Panel on Interventional Radiology. ACR Appropriateness CriteriaÂ® radiologic management of mesenteric ischemia. Reston (VA): American College of Radiology (ACR); 2016. 7 p. [33 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Fidelman N, Funaki BS, Ray CE Jr, Burke CT, Darcy MD, Kinney TB, Kostelic JK, Kouri BE, Lorenz JM, Mansour MA, Nair AV, Nemcek AA Jr, Owens CA, Rockey DC, Saad WEA, Vatakencherry G, Expert Panel on Interventional Radiology. ACR Appropriateness Criteria® radiologic management of mesenteric ischemia. [online publication]. Reston (VA): American College of Radiology (ACR); 2011. 5 p. [24 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

ACR Appropriateness Criteria®

Clinical Condition: Radiologic Management of Mesenteric Ischemia

Variant 1: Patient with recent onset abdominal pain, no peritoneal signs, known atrial fibrillation. CTA shows filling defect in proximal SMA consistent with embolus.

Treatment/Procedure	Rating	Comments
Systemic anticoagulation	8	This procedure may be sole therapy depending on status of the patient but will more often serve as a bridge to transcatheter or surgical evaluation of clot.
Surgical embolectomy	5	Surgical embolectomy may be a first-line treatment option over thrombolytic therapy based on physician preference and clinical presentation.
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Treatment/Procedure	Rating	Comments
Transcatheter thrombolysis	7	This procedure depends on the burden of thrombus seen distally at the time of angiography. Organized thrombus in the setting of atrial fibrillation may not response to thrombolysis.
Angiography and aspiration embolectomy	7	
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Patient with recent onset abdominal pain, no peritoneal signs, known atrial fibrillation. CTA shows calcified atherosclerotic plaque involving the aorta and its major branches, as well as proximal short-segment occlusion of the proximal SMA.

Treatment/Procedure	Rating	Comments
Systemic anticoagulation	8	This procedure is used as an adjunct to surgical or transcatheter treatment.
Surgical endarterectomy or bypass	6	This procedure is used if an endovascular approach with thrombolysis, angioplasty, and stenting is not technically feasible.
Angiography and transcatheter thrombolysis followed by percutaneous transluminal angioplasty and stent placement	8	
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 3: Hospitalized patient with cardiac disease causing low cardiac output who developed abdominal pain but without peritoneal signs. CT angiogram shows patent origins and proximal portions of celiac artery, SMA, and IMA, with diffuse irregular narrowing of SMA branches.

Treatment/Procedure	Rating	Comments
Angiography with infusion of vasodilator	8	This procedure may lead to hypotension.
Systemic infusion of prostaglandin E1	7	This procedure may lead to hypotension.
Systemic anticoagulation	7	
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 4: Patient with history of abdominal pain after meals for the past few months and weight loss. CTA shows aortic atherosclerotic disease and suggests SMA-origin stenosis with occlusion of celiac origin and an occluded IMA.

Treatment/Procedure	Rating	Comments
Angiography with possible percutaneous transluminal angioplasty and stent placement	8	
Surgical bypass or endarterectomy	7	
Systemic anticoagulation	5	This procedure may be complementary to other treatments but is generally not done alone.
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 5: Patient with pain after meals and CTA showing widely patent origins of SMA and IMA, with possible compression of the celiac origin

by the median arcuate ligament.

Treatment/Procedure	Rating	Comments
Mesenteric angiography in lateral projection during both inspiration and expiration	7	CTA or MRA should be performed prior to catheter angiography.
Surgery with median arcuate ligament release, with or without bypass	8	This procedure is performed once diagnosis is confirmed by angiography.
Supportive measures only (analgesics)	7	Median arcuate ligament syndrome is controversial but surgical therapy may be appropriate depending on the clinical situation.
Systemic anticoagulation	2	
Percutaneous transluminal angioplasty with stent placement	4	This procedure is the second-line intervention in patients with recurrent or persistent symptoms despite surgical decompression and where there is evidence of celiac artery narrowing.
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 6: Previously healthy patient with worsening diffuse abdominal pain for 2 weeks. CTA shows occlusion of the superior mesenteric vein and its major tributaries. Small bowel appears normal.

Treatment/Procedure	Rating	Comments
Systemic anticoagulation	9	This procedure may be either primary therapy or adjunctive to thrombolysis depending on age and condition of patient.
Transhepatic superior mesenteric vein catheterization and thrombolytic infusion	7	This procedure depends on severity of symptoms, condition of patient, and response to systemic anticoagulation. Adjunct TIPS creation may be considered for outflow improvement.
SMA angiography followed by thrombolytic infusion	4	This procedure has minimal proven efficacy in the literature.
Surgical thrombectomy	3	This procedure has a low rating because the thrombus typically involves multiple branches.
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Introduction/Background

Mesenteric vascular insufficiency is a serious medical condition that may lead to bowel infarction, morbidity, and mortality that may approach 50%. The most common symptom is abdominal pain, which may be acute and severe or insidious in onset and vague. Postprandial pain is common. On physical examination, patients may exhibit pain out of proportion to physical examination. Causes of mesenteric ischemia may be arterial (e.g., thromboembolism, atherosclerosis, dissection, and vasculitis), mesenteric venous thrombosis, and hypoperfusion (e.g., hypovolemia, shock). The purpose of imaging evaluation is to determine the underlying cause of bowel ischemia, which then helps direct treatment decisions.

Overview of Diagnostic Imaging Modalities

Detection of proximal mesenteric arterial occlusive disease is possible with contrast-enhanced computed tomographic angiography (CTA), magnetic resonance angiography (MRA), and ultrasound (US). Ostial lesions are reliably evaluated with all 3 modalities. Both US and MRA have been directly compared with angiography. Multidetector CT scanners, particularly with sagittal reformatting, are capable of demonstrating the proximal mesenteric vessels very well. CTA relies on administration of iodinated contrast but does not entail the risks of catheter angiography.

In patients with renal insufficiency or a history of severe reaction to iodinated contrast, noncontrast MRA or US of the mesenteric vessel origins is preferred over CTA. Results vary considerably with operator expertise, patient body habitus, and presence of bowel gas, but accuracy in

detecting ostial abnormalities has been reported to be >90%. The more peripheral mesenteric vessels are not as well demonstrated with US or CTA, and angiography has remained the best method to evaluate these vessels. Therefore, if clinical suspicion of mesenteric ischemia is high, a negative CTA or US examination should not preclude selective mesenteric angiography, particularly if distal disease is a consideration.

Mesenteric venous occlusion can be adequately assessed by contrast-enhanced CT or MRI. In cases where these noninvasive diagnostic modalities do not provide a definitive answer, CT arterial portography may be helpful in delineating mesenteric venous anatomy.

Overview of Therapeutic Modalities

Treatments for mesenteric ischemia attempt to reverse the underlying cause, with the goal of prevention of bowel infarction. Treatment choice depends on the underlying etiology of ischemia. For patients with mesenteric arterial occlusive disease there has been a shift away from surgical treatment (e.g., embolectomy, endarterectomy, and arterial bypass) towards endovascular approaches including thrombolysis and clot retrieval in cases of acute embolus (if peritoneal signs are absent), percutaneous transluminal angioplasty (PTA), and stent placement for patients with chronic arterial occlusive disease. Acute nonocclusive mesenteric ischemia (NOMI) can be managed by intra-arterial administration of vasodilators, such as nitroglycerin or papaverine, or by high-dose intravenous prostaglandin E1. First-line treatment for venous mesenteric ischemia is systemic anticoagulation.

Discussion by Variant

Variants 1 and 2: Acute Occlusive Mesenteric Ischemia

Surgery has been the standard of care for acute occlusive mesenteric ischemia over the past decades. Several endovascular techniques have been described in the literature, including aspiration embolectomy and thrombolysis for embolic occlusion of the superior mesenteric artery (SMA), as well as percutaneous transarterial PTA with or without stent placement (PTA/S) for thrombotic occlusions in patients with underlying atherosclerotic disease. Recent literature suggests that in current practice, endovascular techniques are commonly attempted first, and traditional surgical approaches are resorted to when endovascular treatment fails or is not feasible. Use of endovascular approaches has been associated with a decrease in the amount of bowel resected, lower incidence of concomitant renal or respiratory failure, lower subsequent incidence of short bowel syndrome, and lower mortality. However, if symptoms and signs of bowel infarction are present (peritoneal symptoms, pneumoperitoneum, or intramural air on CT), urgent surgery rather than thrombolysis is advised. The inability to confidently exclude bowel infarction in many patients with mesenteric ischemia has limited the widespread use of thrombolysis. Due to the presence of vasospasm associated with occlusive mesenteric ischemia, catheter-directed vasodilator infusion may also be of benefit in some patients with occlusive mesenteric ischemia, especially prior to more definitive therapy. Treatment of underlying stenotic or occlusive lesions using PTA/S can be achieved at the same setting as diagnosis, sometimes after removal of a thrombotic clot by aspiration or thrombolysis.

Variant 3: Acute Nonocclusive Mesenteric Ischemia

In a patient with signs and symptoms of acute mesenteric ischemia, narrowing of peripheral mesenteric vessels or a pattern of alternating dilatation and narrowing suggests NOMI. This diagnosis is best made with conventional angiography, which would also enable initiation of catheter-directed vasodilator infusion therapy. Angiography can provide superior anatomic detail not available from CTA or US. However, recent data suggest that if a patient is not clinically stable enough to undergo angiography, multidetector contrast-enhanced CT may provide adequate information to make a diagnosis of NOMI. Vasoconstriction may lead to bowel ischemia and necrosis with a mortality rate that has been reported to be 70%. Early diagnosis and treatment are critically important in acute mesenteric ischemia to avoid bowel infarction. Typically therapy consists of intra-arterial administration of vasodilators, such as nitroglycerin, papaverine, or glucagon. Administration of high-dose intravenous prostaglandin E1 may be equally effective.

Variant 4: Chronic Mesenteric Ischemia

Chronic mesenteric ischemia most commonly occurs due to atherosclerotic occlusive disease of the mesenteric arteries (celiac axis, SMA, inferior mesenteric artery [IMA]). Signs and symptoms of chronic mesenteric ischemia include weight loss, sitophobia (food fear), and postprandial abdominal pain. Given the relatively rich collateral supply to bowel, signs and symptoms of ischemia typically occur when at least 2 arteries (and often all 3) are affected. Endovascular therapy, particularly PTA and stent placement, has supplanted open surgical repair as the preferred therapy for mesenteric-origin stenoses in patients without bowel infarction. Mortality and morbidity are believed to be lower for endovascular interventions compared to open repair; however, more patients develop recurrent symptoms and require reintervention following endovascular treatment than after open repair. Complications of endovascular treatment include distal mesenteric embolization, branch perforation, dissection, stent dislodgement, and stent thrombosis.

Variant 5: Median Arcuate Ligament Syndrome

The median arcuate ligament is a fibrous band connecting the right and left hemidiaphragms that is present in everyone and results in celiac axis

narrowing in 20% of the population. The incidence and even existence of abdominal symptoms due to compression of the celiac artery by the median arcuate ligament is debatable. The compression has been postulated to limit blood flow to bowel, with resulting ischemic symptoms, or to irritate the celiac ganglion, which results in abdominal pain. Compression of the celiac artery may be a normal finding in asymptomatic patients and is well characterized. Therefore, supportive treatment with analgesics and continued diagnostic evaluation for alternate causes of abdominal pain might be reasonable first steps in patients with suspected median arcuate ligament syndrome.

Patients with imaging evidence of celiac axis compression have been treated with best results in patients who had both celiac decompression (surgical division of the ligament) and some form of celiac artery revascularization. Predictors of successful outcome in 1 study were "postprandial pain pattern (81% cured), age between 40 and 60 (77% cured), and weight loss of 20 pounds or more (67% cured)." There is no evidence supporting the use of stent placement in this entity, and endovascular dilation may be contraindicated unless ligament release has been performed first.

Variant 6: Venous Mesenteric Ischemia

Mesenteric venous thrombosis (MVT) accounts for 5% to 15% of all cases of mesenteric ischemia. Patients may have abdominal pain, nausea, or vomiting. However, clinical diagnosis is often difficult because abdominal symptoms are nonspecific. Diagnosis can be established by noninvasive means, such as multidetector CT and MR venography. The mainstay of therapy is systemic anticoagulation. Generally, patients maintained on systemic anticoagulation have higher chances of recanalization of the occluded veins and lower odds of recurrence. Long-term systemic anticoagulation is usually required. Bleeding in the necrotic bowel may result, but this possibility should not delay systemic anticoagulation, and bleeding has to be treated if it occurs. Thrombolysis with or without mechanical thrombectomy may re-establish splanchnic venous flow and prevent bowel infarction in the setting of an acute or a subacute venous thrombosis. The rate of blood flow restoration by thrombolytic administration into the SMA appears to be lower than that of direct thrombolytic administration into the splanchnic veins.

Summary

- Recommended therapy for acute mesenteric ischemia includes aspiration embolectomy, transcatheter thrombolysis, and angioplasty with or without stenting for the treatment of underlying arterial stenosis. Systemic anticoagulation can be the sole therapy depending on the status of the patient but more often serves as a bridge to transcatheter or surgical evaluation of the thrombus. NOMI may respond to transarterial infusion of vasodilators such as nitroglycerin, papaverine, glucagon, and prostaglandin E1. Side effects of vasodilator therapy include hypotension.
- Recommended therapy for chronic mesenteric ischemia includes angioplasty with or without stent placement and, if an endovascular approach is not possible, surgical bypass or endarterectomy. Systemic anticoagulation can be complementary to the invasive procedures but is typically not offered as monotherapy.
- The diagnosis of median arcuate ligament syndrome is controversial, but surgical release may be appropriate depending on the clinical situation.
- Venous mesenteric ischemia may respond to systemic anticoagulation alone. Transhepatic or transjugular superior mesenteric vein catheterization and thrombolytic infusion can be offered depending on the severity of symptoms, condition of the patient, and response to systemic anticoagulation. Adjunct transjugular intrahepatic portosystemic shunt (TIPS) creation can be considered for outflow improvement.

Abbreviations

- CTA, computed tomography angiography
- IMA, inferior mesenteric artery
- MRA, magnetic resonance angiography
- SMA, superior mesenteric artery
- TIPS, transjugular intrahepatic portosystemic shunt

Clinical Algorithm(s)

Algorithms were not developed from criteria guidelines.

Scope

Disease/Condition(s)

- Acute occlusive mesenteric ischemia
- Acute nonocclusive mesenteric ischemia
- Chronic mesenteric ischemia
- Median arcuate ligament syndrome
- Venous mesenteric ischemia

Guideline Category

Diagnosis

Management

Treatment

Clinical Specialty

Emergency Medicine

Gastroenterology

Internal Medicine

Radiology

Surgery

Intended Users

Health Plans

Hospitals

Managed Care Organizations

Physician Assistants

Physicians

Students

Utilization Management

Guideline Objective(s)

To evaluate the appropriateness of diagnostic imaging modalities used to determine the underlying cause of bowel ischemia, which then helps to direct treatment decisions

Target Population

Patients with suspected or confirmed mesenteric ischemia

Interventions and Practices Considered

1. Systemic anticoagulation
2. Surgical procedures

    - Surgical embolectomy
    - Surgical bypass or endarterectomy
    - Surgery with median arcuate ligament release, with or without bypass
    - Surgical thrombectomy
3. Transcatheter thrombolysis
4. Angiographic procedures
    - Angiography and aspiration embolectomy
    - Angiography and transcatheter thrombolysis followed by percutaneous transluminal angioplasty (PTA) and stent placement
    - Angiography with possible PTA and stent placement
    - Mesenteric angiography in lateral projection during inspiration and expiration
    - Angiography with infusion of vasodilator
    - Superior mesenteric artery (SMA) angiography followed by thrombolytic infusion
5. PTA with stent placement
6. Systemic infusion of prostaglandin E1
7. Transhepatic superior mesenteric vein (SMV) catheterization and thrombolytic infusion
8. Supportive measures only (analgesics)

Major Outcomes Considered

- Sensitivity, specificity, diagnostic accuracy, and positive/negative predictive values of imaging modalities for diagnosis of mesenteric ischemia
- Effectiveness of treatment (technical and clinical success rates)
- Mortality rate
- Incidence of bowel infarction and short bowel syndrome
- Complications of treatment

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Summary

Of the 24 citations in the original bibliography, 24 were retained in the final document.

A new literature search was conducted in December 2013 and updated in November 2015 to identify additional evidence published since the *ACR Appropriateness Criteria® Radiologic Management of Mesenteric Ischemia* topic was finalized. Using the search strategies described in the literature search companion (see the "Availability of Companion Documents" field), 55 articles were found. Six articles were added to the bibliography. Forty-nine articles were not used due to either poor study design, the articles were not relevant or generalizable to the topic, the results were unclear, misinterpreted, or biased, or the articles were already cited in the original bibliography.

The author added 3 citations from bibliographies, Web sites, or books that were not found in the new literature search.

See also the American College of Radiology (ACR) Appropriateness Criteria® literature search process document (see the "Availability of Companion Documents" field) for further information.

Number of Source Documents

Of the 24 citations in the original bibliography, 24 were retained in the final document. The new literature search conducted in December 2013 and updated in November 2015 identified 6 articles that were added to the bibliography. The author added 3 citations from bibliographies, Web sites, or books that were not found in the new literature search.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Definitions of Study Quality Categories

Category 1 - The study is well-designed and accounts for common biases.

Category 2 - The study is moderately well-designed and accounts for most common biases.

Category 3 - The study has important study design limitations.

Category 4 - The study or source is not useful as primary evidence. The article may not be a clinical study, the study design is invalid, or conclusions are based on expert consensus.

> The study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description);
>
> *Or*
>
> The study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence;
>
> *Or*
>
> The study is an expert opinion or consensus document.

Category M - Meta-analysis studies are not rated for study quality using the study element method because the method is designed to evaluate individual studies only. An "M" for the study quality will indicate that the study quality has not been evaluated for the meta-analysis study.

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The topic author assesses the literature then drafts or revises the narrative summarizing the evidence found in the literature. American College of Radiology (ACR) staff drafts an evidence table based on the analysis of the selected literature. These tables rate the study quality for each article included in the narrative.

The expert panel reviews the narrative, evidence table and the supporting literature for each of the topic-variant combinations and assigns an appropriateness rating for each procedure listed in the variant table(s). Each individual panel member assigns a rating based on his/her interpretation of the available evidence.

More information about the evidence table development process can be found in the ACR Appropriateness Criteria® Evidence Table Development document (see the "Availability of Companion Documents" field).

Methods Used to Formulate the Recommendations

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

Rating Appropriateness

The American College of Radiology (ACR) Appropriateness Criteria (AC) methodology is based on the RAND Appropriateness Method. The appropriateness ratings for each of the procedures or treatments included in the AC topics are determined using a modified Delphi method. A series of surveys are conducted to elicit each panelist's expert interpretation of the evidence, based on the available data, regarding the appropriateness of an imaging or therapeutic procedure for a specific clinical scenario. The expert panel members review the evidence presented and assess the risks or harms of doing the procedure balanced with the benefits of performing the procedure. The direct or indirect costs of a procedure are not considered as a risk or harm when determining appropriateness. When the evidence for a specific topic and variant is uncertain or incomplete, expert opinion may supplement the available evidence or may be the sole source for assessing the appropriateness.

The appropriateness is represented on an ordinal scale that uses integers from 1 to 9 grouped into three categories: 1, 2, or 3 are in the category "usually not appropriate" where the harms of doing the procedure outweigh the benefits; and 7, 8, or 9 are in the category "usually appropriate" where the benefits of doing a procedure outweigh the harms or risks. The middle category, designated "may be appropriate," is represented by 4, 5, or 6 on the scale. The middle category is when the risks and benefits are equivocal or unclear, the dispersion of the individual ratings from the group median rating is too large (i.e., disagreement), the evidence is contradictory or unclear, or there are special circumstances or subpopulations which could influence the risks or benefits that are embedded in the variant.

The ratings assigned by each panel member are presented in a table displaying the frequency distribution of the ratings without identifying which members provided any particular rating. To determine the panel's recommendation, the rating category that contains the median group rating without disagreement is selected. This may be determined after either the first or second rating round. If there is disagreement after the second rating round, the recommendation is "May be appropriate."

This modified Delphi method enables each panelist to articulate his or her individual interpretations of the evidence or expert opinion without excessive influence from fellow panelists in a simple, standardized, and economical process. For additional information on the ratings process see the Rating Round Information document.

Additional methodology documents, including a more detailed explanation of the complete topic development process and all ACR AC topics can be found on the ACR Web site (see also the "Availability of Companion Documents" field).

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria (AC).

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The recommendations are based on analysis of the current medical evidence literature and the application of the RAND/UCLA appropriateness method and expert panel consensus.

Summary of Evidence

Of the 33 references cited in the *ACR Appropriateness Criteria® Radiologic Management of Mesenteric Ischemia* document, 19 are categorized as therapeutic references including 6 good quality studies. Additionally, 13 references are categorized as diagnostic references including 3 good quality studies, and 4 quality studies that may have design limitations. There are 19 references that may not be useful as primary evidence. There is 1 reference that is a meta-analysis study.

While there are references that report on studies with design limitations, 9 good quality studies provide good evidence.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Use of the appropriate imaging evaluation aids in determining the underlying cause of bowel ischemia, which then helps direct treatment decisions.
- Use of endovascular approaches has been associated with a decrease in the amount of bowel resected, lower incidence of concomitant renal or respiratory failure, lower subsequent incidence of short bowel syndrome, and lower mortality.
- Early diagnosis and treatment of acute mesenteric ischemia are critically important to avoid bowel infarction.

Potential Harms

- Computed tomographic angiography (CTA) relies on administration of iodinated contrast but does not entail the risks of catheter angiography.
- Side effects of vasodilator therapy include hypotension.
- Complications of endovascular treatment include distal mesenteric embolization, branch perforation, dissection, stent dislodgement, and stent thrombosis.
- Bleeding in the necrotic bowel may result from systemic anticoagulation.

Contraindications

Contraindications

There is no evidence supporting the use of stent placement for median arcuate ligament syndrome, and endovascular dilation may be contraindicated unless ligament release has been performed first.

Qualifying Statements

Qualifying Statements

- The American College of Radiology (ACR) Committee on Appropriateness Criteria (AC) and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to

guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

- ACR seeks and encourages collaboration with other organizations on the development of the ACR AC through society representation on expert panels. Participation by representatives from collaborating societies on the expert panel does not necessarily imply individual or society endorsement of the final document.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2016

Guideline Developer(s)

American College of Radiology - Medical Specialty Society

Source(s) of Funding

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

Guideline Committee

Committee on Appropriateness Criteria, Expert Panel on Interventional Radiology

Composition of Group That Authored the Guideline

Panel Members: Nicholas Fidelman, MD (*Principal Author*); Ali F. AbuRahma, MD; Brooks D. Cash, MD; Baljendra S. Kapoor, MB, BS; M-Grace Knuttinen, MD, PhD; Jeet Minocha MD; Paul J. Rochon, MD; Colette M. Shaw, MB; Charles E. Ray, Jr, MD, PhD (*Specialty Chair*); Jonathan M. Lorenz, MD (*Panel Chair*)

Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Fidelman N, Funaki BS, Ray CE Jr, Burke CT, Darcy MD, Kinney TB, Kostelic JK, Kouri BE, Lorenz JM, Mansour MA, Nair AV, Nemcek AA Jr, Owens CA, Rockey DC, Saad WEA, Vatakencherry G, Expert Panel on Interventional Radiology. ACR Appropriateness Criteria® radiologic management of mesenteric ischemia. [online publication]. Reston (VA): American College of Radiology (ACR); 2011. 5 p. [24 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from the American College of Radiology (ACR) Web site .

Availability of Companion Documents

The following are available:

- ACR Appropriateness Criteria®. Overview. Reston (VA): American College of Radiology; 2015 Oct. 3 p. Available from the American College of Radiology (ACR) Web site .
- ACR Appropriateness Criteria®. Literature search process. Reston (VA): American College of Radiology; 2015 Feb. 1 p. Available from the ACR Web site .
- ACR Appropriateness Criteria®. Evidence table development. Reston (VA): American College of Radiology; 2015 Nov. 5 p. Available from the ACR Web site .
- ACR Appropriateness Criteria®. Topic development process. Reston (VA): American College of Radiology; 2015 Nov. 2 p. Available from the ACR Web site .
- ACR Appropriateness Criteria®. Rating round information. Reston (VA): American College of Radiology; 2015 Apr. 5 p. Available from the ACR Web site .

- ACR Appropriateness Criteria®. Manual on contrast media. Reston (VA): American College of Radiology; 2016. 128 p. Available from the ACR Web site.
- ACR Appropriateness Criteria®. Procedure information. Reston (VA): American College of Radiology; 2016 May. 2 p. Available from the ACR Web site.
- ACR Appropriateness Criteria® radiologic management of mesenteric ischemia. Evidence table. Reston (VA): American College of Radiology; 2016. 14 p. Available from the ACR Web site.
- ACR Appropriateness Criteria® radiologic management of mesenteric ischemia. Literature search. Reston (VA): American College of Radiology; 2016. 2 p. Available from the ACR Web site.

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on June 24, 2009. This summary was updated by ECRI Institute on July 6, 2011. This summary was updated by ECRI Institute on March 10, 2014 following the U.S. Food and Drug Administration advisory on Low Molecular Weight Heparins. This summary was updated by ECRI Institute on September 29, 2016.

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